TEXAS INSTRUMENTS

KLIXON®

3BA Motor Protection Sensors

General Description

The Klixon 3BA motor protection sensor provides economical and reliable protection for three-phase motors. The 3BA is a Positive Temperature Coefficient (PTC) sensor with a low resistance property. Once the motor winding temperature increases to a pre-determined trip temperature, the sensor resistance increases several orders of magnitude for a correspondingly small change in temperature.

This sharp increase in resistance causes the Texas Instruments control module (See table below) to de-energize an internal relay which in turn opens the contactor/starter coil circuit. Because the system places thermal sensors at the precise point where protection is needed (in the motor windings, for instance), equipment is protected against heat damage regardless of cause - including external faults such as blocked ventilation.

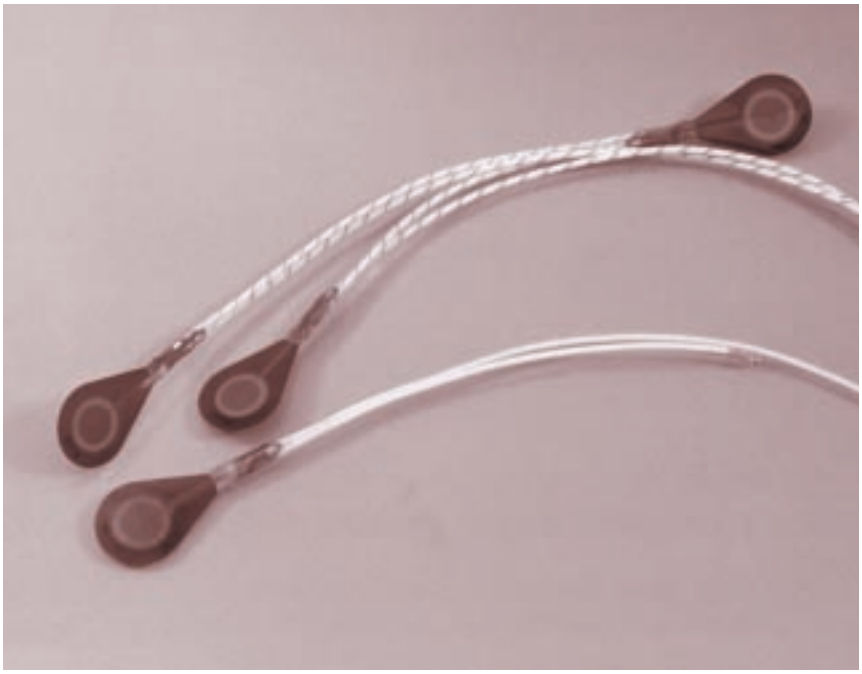
An advantage of the PTC type sensor is that several of them may be connected in series without a significant loss of calibration. If only one sensor reaches the trip temperature, the module will trip.

Sensor vs. Electronic Module

TI PTC Sensor	All TI PTC Sensors can be used in Conjunction with any Electronic Control Module
3BA	15AA, 30AA, 31AA, 32AA, 40AA, 41AA, 42AA, 50AA, 51AA, 2ACE

Suggested Applications

- Motor and Generator Stator Windings
- Transformers
- Clutch and Brake Coils
- Electromagnets
- Induction Regulators
- Solenoid Operators



Physical Specifications

- PTC pill, shown above, is sandwiched between two layers of Dupont Kapton* with copper foil.

Features

- Can be applied to track rates of temperature rise in excess of 30ºC/sec
- Wide trip temperature range from 80ºC to 155ºC in 5º increments
- Standard RT Curve for all Module Applications
- Rugged design for installation during motor manufacturing
- Withstand standard varnish dip and bake operations
- Directly senses winding overheating
- Independent of Motor HP
- No field adjustment required
- Easily specified and installed
- Field proven Klixon design
- Tamperproof
- Rapid responding
- UL recognized component

Motor Protection

- Locked Rotor
- Running Overload
- Single Phasing
- Voltage Unbalance
- High Motor Ambient
- Blocked Ventilation
- Primary Single-Phasing
- High Altitude Conditions

Compressor Protection

- Light load
- Loss of charge
- High discharge temperatures
- Oil breakdown

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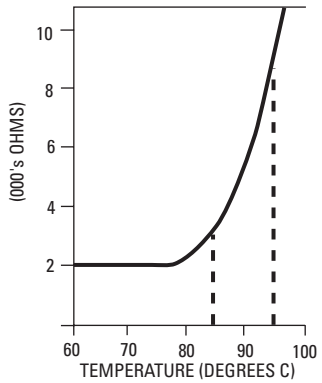
3BA
PTC MOTOR SENSORS

What is PTC?

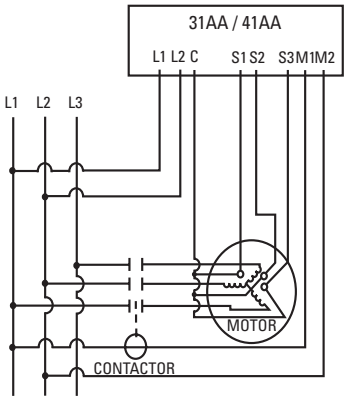
PTC stands for *Positive Temperature Coefficient*, a conductive ceramic material used by Texas Instruments. PTC's most useful electrical property is its ability to remain at a low base resistance over a wide temperature band, and to increase its resistance abruptly at some predetermined elevated temperature. When this increase in resistance occurs, the PTC sensor acts as a solid state thermal switch and provides an input signal to the Texas Instruments electronic module which controls power to a motor starter or contactor coil.

Illustration of PTC Properties

Typical Characteristic Curve 3BA 095 AA

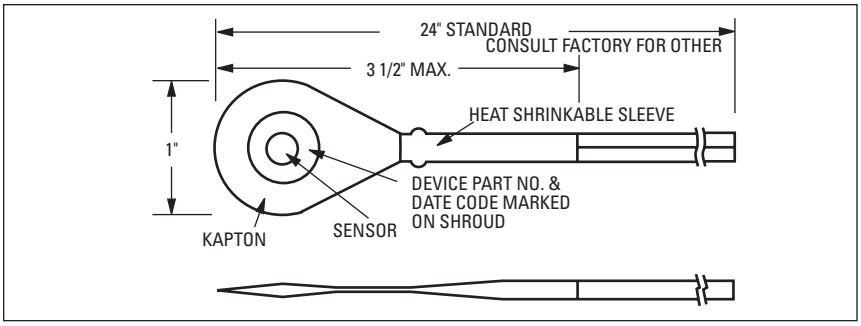


Typical Application



*TM of E. I. duPont deNemours & Co. (Inc.)

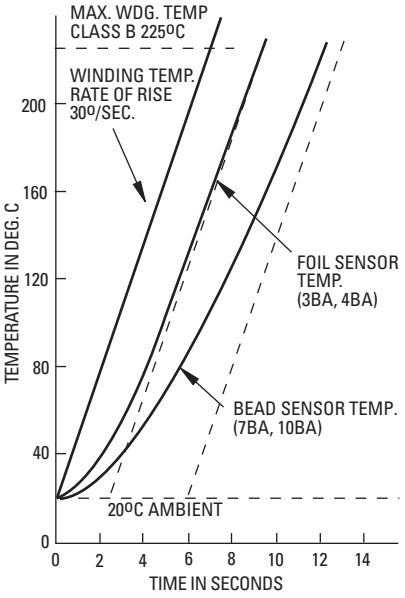
3BA Dimensional Drawings



3BA Operating Specifications

Supply Voltage	120 VAC, 208/240 VAC (±10%)
Switching Capacity	24 VAC (124 VA), 120 VAC (660 VA), 240 VAC (720 VA)
Ambient	-40°F to 160°F
Frequency	45 - 65 Hz
Trip Temperature	80° to 155° in 5°C Increments
Trip Tolerance	±5°C
Trip/Reset Differential	5°C to 20°C from Actual Trip of a Particular Sensor
Contactor Rating	Through Nema Size 5
Resistance @ 25°C (k ohms)*	.500 - 2.500

BA Sensor-Typical Characteristic Curves



Example of sensor temperature tracking capability with locked rotor conditions.

*The sensor material has a non-linear voltage-current characteristic such that voltage / current applied across the sensor by the meter may influence the final result. TI recommends a voltage supply 0.8-5.0 volts to duplicate the application. Larger voltage supplies such as 9V can be used as long as a 15mA current is not exceeded.

Sensor Nomenclature

3BA XXX X XXX

3BA is the **Sensor Type:**

1. 3BA - Foil
2. 4BA - Foil
3. 7BA - Bead
4. 10BA - Bead

XXX is the **Operating Temperature:**

- Three digit trip temperature rating in 5°C increments from 80°C to 155°C**

X is the **Sensor Configuration:**

1 - for Single Sensor

3 - for Three Sensor Harness

XXX is the **Wire Lead:**

- Designates wire gauge insulation and lead length. (Standard is 24", 20GA DMD, 600V, 200°C rated wire)

**Range of temperature ratings varies by individual sensor type. Other temperatures available 4BA, 7BA and 10BA.

For further information write or call:

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